

Ideas of reference and quantum entanglement

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Abstract

The isolation of one single pathological symptom instead of the investigation of complex syndromes sets a plain, unambiguous investigative framework.

Let's consider ideas of reference as a symptom caused by electric activities arising from arrhythmogenic foci stimulated by anxiety. Under normal conditions, the high threshold of excitability prevents the symptom. When a pathological arrhythmogenic situation arises the frequency of neuronal firing is modified. The resonance disaster, i.e. the reference ideas, created by interactions with the environment producing a mixed system is sparked only on the presence of an altered threshold of excitability due to arrhythmogenic foci.

Another possibility is to approach the symptom as a fractal potentiation. Both approaches allow for a transitive connection between the microscale of brain physiology and the macroscale of observable symptoms. The symptom corresponds to the mixed system created by the fractal similarity between individual system and environment, or the wave frequency resonance between systems. Both approaches are determined by interactions mixing previously pure, isolated systems, a) the patient and, for instance, b) the TV host. Nothing is closer to a mixed system than ideas of reference. It blends together individual and collective dimensions, brain activity and environment. The wave function collapse and de-coherence are possible quantum events triggering the mixing of different systems.

Ideas of reference present the signature of quantum entanglement phenomena. They are objective, macroscopic entanglements entailing a nonlocality aspect of a holistic kind brought about by non-interacting constituents. They produce a classicalization of quantum phenomena.

Key Words: Ideas of Reference, Quantum Entanglement, High Energy Physics, Classicalization

Introduction

Physiopathology, particularly when high energy conditions appear, facilitates the understanding of physiology. Tiny effects are amplified in pathological situations. Ideas of reference are a high energy symptom comparable to a highly-directional antenna aimed at point-to-point links. The 'antenna' is an expression of brain overactivity sustained by high energy physics. It produces the appearance of a quantum state in a classical world.

Ideas of reference considered as mixed system phenomena present the signature of quantum entanglement phenomena. They are objective, macroscopic entanglements entailing

a nonlocality aspect of a holistic kind brought about by non-interacting constituents spatially separated¹.

The physics of fundamental particles is not the same as the physics of our everyday Newtonian reality. Systems on the scale of atoms behave differently. As a quantum computer, the brain shares the same double condition of all matter, particle and wave. A single dynamics rules all natural processes on their respective scales. The macro-objectivation question in neuroscience can be approached as a measurement question of fundamental particles.

The measurement problem led to an understanding of Heisenberg's uncertainty principle based on the idealistic philosophical perspective of the Copenhagen interpretation. Such an explanation takes away quantum realism. This paper vindicates the opposite assertion: the measurement problem is a direct outcome of quantum realism.

There's no reason to suppose that the brain system, with its wave and quantum nature, could be anything different than an objective, realistic system. Therefore, to establish a resilient connection between a clinical symptom and a consistent hypothesis of the underlying quantum mechanics, furthers clinical neuroscience and opens up an investigative pathway to observable quantum phenomena.

Whether one takes the discontinuous transitions of the matrix mechanics of Born, Jordan and Heisenberg papers or the Schrödinger's proposal of wave resonance phenomena we remain bound to the wave-particle condition of all matter, as found by Einstein and De Broglie. Both perspectives are consistent with brain activity and with axon-synaptic transmission.

The wave collapse as a possible explanation of the mixed states generated by the entanglement of the quantum biological system and its environment, sets the description on the objective foundation of a quantum system. The mixed systems are connected in a double way.

¹ Einstein considered separability the blue print of realism. For him this was the main reason to reject a realistic interpretation of quantum mechanics. Einstein, 1948, 321-322. He considered the so called EPR paper as a faulty explanation. It was entirely written by his ex-students Rosen and Podolsky.

The knowing processes involved in quantic measurements are the environment in relation to the quantum particles. At the same time, the wave collapse on the quantic level of the biological system is affected by the entanglement with its environment. The objective and universal nature of quantum mechanics is governed by the same laws at both sides of the entangled systems. There is a possible third protagonist on this mixed system which is the quantum nature of space-time itself.

Heisenberg's "Anschaulichkeit" problem results from approaching a mixed realistic system as a pure, isolated system. As Einstein's explanation in relation to quantic non-locality was wrong (conceived on the restrictions of light speed), but not the universal realism of his theory, so are some of Heisenberg's explanations of the uncertainty principle wrong, but not the universal realism of quantum mechanics. Schrödinger's theory sets once again reality in a causal, space-time foundation. Precisely where Einstein thought it should be, by his commitment to a Spinozian philosophical perspective instead of the idealistic philosophical perspective of the Copenhagen interpretation.

The restriction posed by the uncertainty principle is not of an ontological nature as some interpreters of the principle maintain. DNA and biology magnetic fields provide the forces that carry photons from one particle to another. As they collide both particles experiment a discontinuous change. Photons push the electrons apart provoking attraction or repulse as the photon is scattered by the electron. Because the uncertainty relation does not hold for the past, it can always be measured afterwards and reveal the past position. This means the difficulty is circumstantial but not essential. What is physically real is preserved and not created by observation. That's one of the approaches to quantum realism in this paper which is relevant to ideas of reference.

Discussion

Because reference ideas are exemplary of how the individual world impinges on the collective one and vice-versa, they are of scientific importance to neurosciences. Not only as an occasion to research and locate the arrhythmogenic foci but as an opening to explore the fractalization phenomena involved in the transition from the microscale of the quantum nature of brain physiology to the macroscale of quantum realism through an observable symptom. The interaction of systems is a superposition of fractals or of similar frequencies on the mixed system. The wave function collapse and decoherence phenomena bring together both wave and particle perspectives.

If the potential of a neuron is not lowered after it fires it is bound to repeatedly fire. The repetition might be produced by a pathological condition of rapid ectopic, multifocal activity of a group of neurons, very much alike the phenomena of cardiac fibrillation. A persistent reinitiating process maintains the high potential. The shortening of the refractory periods produce 'neuron arrhythmias'.

Let's consider ideas of reference as a symptom caused by electric activities arising from arrhythmogenic foci stimulated by anxiety. These can range from periods of short paroxysms to persistent or permanent conditions, from acute to chronic disturbances. These phenomena can be approached through the wave perspective in a close analogy to the resonance disaster occurring when the sound waves frequencies of the environment match those of the vibration of the individual system in an over excited condition. Under normal conditions, the high threshold of excitability prevents the symptom. The resonance disaster, i.e. the reference ideas, created by interactions with the environment producing a mixed system is ignited only on the presence of an altered threshold of excitability.

When a pathological arrhythmogenic situation arises the frequency of neuronal firing is modified. An alteration of neuronal firing frequency is to be expected in extreme frequencies, both lower or higher. The synchronization of rhythms of the brain waves is modified. How they

cohere or decohere with each other through harmonics or discordant frequencies in the occurrence of reference idea is a promising research topic.

Through a particle perspective, the resonance frequency takes the shape of a fractal potentiation. Both approaches allow for a transitive connection between the microscale of brain physiology and the macroscale of observable symptoms. The symptom corresponds to the mixed system created by the fractal similarity between individual system and environment, or the wave frequency resonance between systems. Both approaches are determined by interactions mixing previously pure, isolated systems. Nothing is closer to a mixed system than ideas of reference. It blends together individual and collective dimensions, brain activity and environment.

Ideas of reference as mixed system phenomena present the signature of quantum entanglement phenomena. They are objective, macroscopic entanglements entailing a nonlocality aspect of a holistic kind brought about by non-interacting constituents spatially separated. The particularity of the contents are background independent. The system can be approached as a category. It is precisely because they are background free that they match. However, they are directly dependent on the historical background of the subject which accounts for the impossibility of an a priori definiteness of the properties of the symptom, i.e. the specific contents of the symptom. These features are fully compatible with quantum systems: unpredictability and ‘knowledge’ or information.

As the particle state is so to speak ‘defined’ by knowledge the particular content of the symptom comes about exclusively through a meaningful, identifiable, interference with the environment, as through a functor between categories. The morphism occurs when a functor connects two categories, the individual one and the collective. If the meaningful, identifiable, knowable functor doesn’t occur, there’s no symptom, i.e. no morphism. The common dynamics proposed for both quantum phenomena and reference ideas is the high energy state and wave

function collapse. The jitters created by the electrical overactivity of brain waves are connected to quantum collapse mechanisms. Excess jittering results in the wave function collapse to a single meaningful locality creating the symptom as a macro objectivation of particle quantum interactions. This of course, precludes any single universally true content of the symptom, i.e. a single predictable state of affairs. The symptom is probabilistic.

In ideas of reference what is entangled are precisely ideas, i.e. information. Only when the entanglement occurs the symptom becomes known by its content - the information. At the same time, it is the knowledge, or the information 'delivered' by the entanglement that defines and determinates the symptom. The perception of the content 'makes' the idea, and vice-versa. Such a situation mirrors on a macroscopic level what Heisenberg saw in quantum mechanics at the atomic and subatomic levels: observation determinates the particularity of the observable. Both knowings, Heisenberg's and reference ideas' are epistemic probabilities yet, they do not exclude realism. They are symmetric in another way: both are related to an imprecise knowledge carrying with it the notion of uncertainty. In Heisenberg's case if the momentum is known the position is unknown and vice-versa. In the reference idea the environmental referent entangled in the mixed system remains of uncertain Anschauliche knowledge nevertheless, real. The idea about the referent is false, but the existence of the referent is real.

The "TV is talking about my problems" cannot be translated into a meaningless statement. It could, however, present a particular kind of symmetry where its falsity corresponds to the knowledge delivered by the experiments with elementary particles. The symptom presents a false proposition, but not a meaningless one. A false proposition is not meaningless because its negation is true. Consider the symptom: "The TV is talking about my problems." The negation of this proposition is true: "The TV is NOT talking about my problems". Hence, it is not meaningless. Or else, to accept or to negate it would be equally

meaningless. The explanatory principle to a full capture of the phenomena produced by interferences (morphisms) between mixed systems in the border transition to macro objectivation of observables must include meaningful knowledge, as quantum mechanics purports. A meaningfulness that is background independent and specific to the history of the subject, bringing quantum realism to living life.

Heisenberg's saying that what we observe is not nature itself, but nature exposed to our method of understanding is an accurate description of a subject's method of understanding his/her ideas of reference.

As an entanglement symptom, ideas of reference reveal the emergence of classicality in a context that apparently departs from classicality. They are a fractalization of quantum properties from a microscopic to a clinical, macroscopic level. The precise outcome of the symptom is unpredictable before it becomes an observable. The notion that quantum mechanics breaks down at the macro level and has a limited field of application is undermined by the macro-objectivation of a symptom brought about by the entanglement of mixed systems, or by the functors of categories. Ideas of reference are a strong hint that quantum properties survive on a macroscopic level bearing the blue print of quantum mechanics.

We could say that reference ideas approached as entanglement phenomena are 'embarrassing superpositions at the macroscopic level involving different spatial locations of macroscopic objects'. Where and when the superpositions occur are entirely background independent (that's precisely why they are bound to occur). Although defined by the particularity of objective and historical dynamics of the subject's life processes. They are records of the past and markers of the present. The temporal evolution of the quantum mechanical state remains unsolved.

Although the pathological processes are not physiological but rather results of mixed systems, their macro objectivation rescues the realism implied in all physiopathology. The

assumption that micro and macroprocesses are indeed governed by the same laws requires that in the same manner that the particle state is 'defined by knowledge' so is the symptom (the morphism).

However, a complete identification between the Heisenberg uncertainty proposition with a subjective creation of epistemic probabilities excluding realism is hindered by the scaling behavior that subsists in the objective reality of the two entangled systems, or the two categories, the individual and his environment.

The entanglement in ideas of reference suggest that, on the macro level, the quantum properties are enhanced instead of being destroyed through their interaction with the surroundings. Ideas of reference present a sort of diffeomorphic chirality between the macro and micro level of quantum entanglements. The disappearance of quantum properties produced by decoherence when the size of a quantum system is increased is not necessarily the failure of a classical system to preserve quantum properties.

Suppression of interferences arises in the interface with the environment or collapse of the wave function. At this point, the theories of collapse and decoherence are not final. Nevertheless, quantum decoherence in its complex relation with wave function collapse might be the core process that endows macroscopic systems to lose and-or retain quantum properties, through a cascade of alternate regimes. Quantum to classical, back to quantum and to classical again, and so on, in a chain of collapses and decoherence suppressions where the quantum properties disappear and reappear ruled by an underlying group of symmetries. This is a likely consequence of the wave-particle nature of all matter. The type of symmetries ruling the cascade of alternate regimes demarcate the properties to be preserved in the scaling behavior of the quantum core process. It is experimentally verified that wave components might be identified during the processes of collapse and decoherence.

The hypothesis that ideas of reference are a consistent empirical reality of quantum entanglement opens up different approaches to the progressions of decoherence and collapse, advancing knowledge for both brain physiology and quantum mechanics and their relation to quantum field theory (QFT). There is no better quantum computer available to observation than the living brain. The clinical reappearance of quantum properties suggests that the scale invariance of the quantum observable is operational under particular circumstances of classical states. Quantum mechanics outside the lab, in real life, with living people, has infinite degrees of freedom, becoming even more complex in the quantum field produced.

It was already suggested that decoherence phenomena at the transition between quantum and classical regimes in the inflationary era of the universe were driven by quantic fluctuations. The transition of quantic to classical fluctuations are temperature dependent. Electrical synapses allow electric signals to travel between interneurons. An electric pulse releases heat. Normally, the heat is absorbed instead of being dissipated in a sort of dipole flip-flop caused by stimulation. The de-regulation of the latency, the speed and the frequency of the trigger in the fibrillation analogy is liable to produce temperature oscillations modifying the normal correlations of electrical and thermal effects, provoking quantum fluctuations and decoherence. Usually the subjects presenting ideas of reference report headaches, specially frontal and-or on the back of the head. Sensations of pressure in the head are also reported. Some people feel they have a big ear on the back of the head.

Once the symptom is defined as a child of quantic dynamics, probability should be employed in its reading. A consistent probabilistic interpretation of the symptom is imperative to avoid a so called 'hermeneutics of suspicion' which splits the symptom into a manifest and a latent content. This method scourges the symptom of its eigenvalue. Such a procedure ends up transferring its own theoretical tenets to the latent, muddling the very manifestation of the

quantum observable as a true representation of the quantic energy of the system. The symptom reading must be phenomenologically rigorous.

A more complete grasp of the interpretation procedures or, the reading of the symptom by a third part, gives rise to epistemic issues surpassing the bounds of this paper. They are tied up to the psychiatrist or psychologist indirectly involved in the experience. These go beyond the role of the subject as the producer of the observable symptom. In this case, the outcome of the entanglement is defined by the subject that experiences the observable, because she (or he) is the experience herself. At this level unpredictability and the operational role of the observer in the outcome of the observable i.e. of the reference idea, are incontrovertible. It reminds of von Neumann's assumption that the collapse occurs at the level of consciousness.

The explanatory principle to a full capture of the phenomena produced by interferences between mixed systems in the border transition to macro objectivation of observables includes meaningfulness. A meaningfulness that is background independent and specific to the history of the subject, bringing quantum realism to living life. The subject's background independence can be understood on the lines of an interventionist causal notion.

Unless one is prone to believe in spooky action at a distance the quantum properties of reference ideas on a macro level must be associated with physical, objective dynamics of quantum properties on an atomic level. They are the 'survival' of these properties on the classical world developed by both, Euclidean and non-Euclidian groups of symmetries showing scaling behavior. A topological quantum field approach to reference ideas is a further step.

Conclusion

This paper proposes the understanding of ideas of reference as an expression of quantum entanglement. It calls attention to the methodological advantage of isolating a single symptom instead of studying a complex syndrome. Physiopathology, particularly when high energy conditions appear, facilitates the understanding of physiology, because tiny effects are

amplified in pathological situations. Ideas of reference are a high energy symptom revealing brain overactivity sustained by high energy physics. It produces the appearance of a quantum state in a classical world.

The relevance for neurosciences as well as for quantum physics is noteworthy. It opens up a new and significant pathway to psychiatry research. To establish a consistent connection between clinical symptoms and quantum dynamics takes forward the elucidation of notorious difficulties. One is the bond established between clinical symptoms and scientific reality, the other, is a step towards fitting together the unclear connection between quantum mechanical description of reality and the classical world through psychiatry, i.e. through high energy symptoms.

Because of the infinite degree of freedom outside lab confined conditions, psychiatric symptoms as quantum entanglement ties the physics of particles to quantum field theory. The debated ontological relation between quantum (particle) mechanics and quantum field might find a clue through a further examination of ideas of reference as entanglement phenomena 'physically real' in a classical world. These are examples of background independent phenomena that provide quantum mechanics with a realistic interpretation and psychiatric symptoms with scientific reality. A topological quantum field approach to psychiatric phenomena opens up a great domain of investigation, knowledge and experience.

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